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Analyzing Differentiated Instructions in Inclusive Education of Gifted Preschoolers

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Abstract

The article presents the findings of the research probe, whose aim was to explore the level of application of differentiated instructions in inclusive education of gifted pre-schoolers, declared by kindergarten teachers in the questionnaire. The main finding of the study was the fact that teachers with teaching practice longer than 10 years, those teaching at age-heterogeneous groups, and teachers trained at this issue on purpose, show higher level of application of differentiated instructions. On the other hand, number of pupils in a class does not influence the level of differentiated instructions.

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Keywords: *giftedness; gifted preschoolers; inclusive education; differentiated instructions.*

1. Introduction and theoretical background

There has been a recent increase in exploring the issue of education of gifted preschoolers. In the context of the issue, however, there is an area that, despite its relevance, is not adequately anchored in theory or in practice. It is education of gifted preschoolers.

The issue of gifted preschoolers has begun to enforce professionally since the late 20th century. According to Hříbková (2010), this raise of concern was influenced by many researches. They proved that there are certain

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preschoolers' mental signs displaying potential possibilities for high performance in the future. It was equally proved that systematic development of pupils' gifts and talents at a lower school age is not prosperous. The key age for gifts and talents development is preschool age which raises the relevance of gifted preschoolers' educations. Following authors focus on the issue of gifted pre-schoolers' education: Hertzog (2009), Olszewski-Kubilius (2003), and partially Davis & col. (2011), Porter (1999), Gallagher & Gallagher (1994), Hříbková (2010) and others.

In a strict sense, we define preschool age as age from 3 to 6 (7) years, culminating in the child's entry to school (Vágnerová, 2005). In a broader sense, it is the period from birth, sometimes including prenatal development, until the child's entry to school (Langmeier & Krejčířová, 1998). The term pre-school age can be also replaced with the term early childhood. Another difference in defining preschool age is related to different structure of education system in the world, and different child's entry to elementary education. While Sankar-DeLeeuw (1999) uses the term gifted preschoolers to describe gifted children aged 3.5 to 6 years, the National Association for the Education of Young Children (NAEYC) defines this target group of children aged from 3 to 8 years. Relating to the following study, in our article we understand preschool age as a period from 3 to 6(7) years of age, when a child can attend a kindergarten in the Czech Republic.

When we try to define giftedness, it is most often described as an individual's ability in a selected area, recognized by the socio-cultural environment, which is quantitatively and qualitatively more developed in comparison with their peers (Heward, 2013). For the purpose of defining gifted preschoolers' giftedness we use so called potential definitions of giftedness (Sankar-DeLeeuw, 1999) which assume the existence of child's potential for outstanding intellectual or non-intellectual performance and do not include the condition of demonstrated performance. In our research probe, we focus on giftedness in the intellectual area.

Let us focus on education of gifted children in the kindergartens. Modification of kindergarten curriculum is recommended in the interconnected components of its content, process, product, environment and assessment, in order to respect specific educational needs of gifted individuals (Riley, 2011; Smith, 2006). The output is then integrated enriching curriculum for gifted children (Cukierkorn & col., 2007). What is meant by content modification is using broad-based topics and problems, which will also allow for deep exploration of academic and interest areas. For preschool-aged children, content should come from several domains, including aesthetic, affective, cognitive, language, physical, and social domains and it is necessary to differentiate the content in each of these areas. Process modification is change of education management in terms of usage of the educational methods and organizational forms, with a focus on strategies developing problem solving, critical and creative thinking. Product modification is a requirement for qualitative or quantitative change of the educational results, where gifted children are given the possibility to reach the highest possible goal in education. Environment modification includes personal and relationship change (high quality communication of all the participants of educational process, cooperation, etc.), spatial and material change (didactic aids, specialized classrooms, etc.). Assessment modification is related to changes in assessment of the results of education which should be forming and motivating.

There has been a recent increase in connecting principles of gifted children education and requests for inclusive education (Riley, 2011). Children are not divided into two groups (gifted ones and ungifted ones), but there is just one heterogeneous group with different individual needs. All the participants of educational process adjust themselves to different needs of all the children, and they try to create differentiated conditions for inclusion of all the children to all of the activities related to preschool education. Educational strategies leading to child's inclusion are maximally used during the educational process (Nind & col. 2013). Strategies leading to exclusion of the child from the team are limited to minimum. To support the educational strategies of inclusive education, Tomlinson (2013) recommends so called differentiated instruction that provides guidance for teachers in addressing children differences in readiness, interest, and learning profile, with the goal of maximizing the capacity of each learner. Differentiated instructions include modification of all the parts of curriculum, it means its content, process, product, environment, and evaluation.

There are not enough empirical studies related to education of gifted pre-schoolers. While browsing databases EBSCO, Academic Search Complete and ProQuest Central, we have found 2 studies from the USA exploring the modifying strategies of elementary school teachers for children from 5 to 11 years. The outputs of both studies, Westberg & Daoust (2004) and Van Tassel-Baska & Stambaugh (2005), report that relatively few teachers were modifying their classroom instructions for the pupils identified as gifted in regular classrooms. Regarding different division of education system in the world, in the aforementioned databases we do not find and study focusing on inclusive education of gifted preschoolers aged 3 to 6(7) years.

Our research focuses on application of differentiated instructions on gifted preschoolers by kindergarten

teachers. Our goal is to use a questionnaire to decide, whether teachers apply integrated enriching curriculum for gifted children development, and if they do, whether they follow the basic principles of inclusive education.

2. Research methodology

The research was aimed at exploring different levels of applying differentiated instructions in education of gifted pre-schoolers declared by kindergarten teachers in the questionnaires.

Partial goals were:

1. To assess the level of application of differentiated instructions in education of gifted pupils stated in the questionnaire as a whole, and to detect the best and worst assessed questionnaire items.
2. To assess the level of application of differentiated instructions in education of gifted pupils in terms of individual items (hereinafter as 3 factors), and from the point of view of chosen demographic characteristics of teachers and classrooms (length of teaching practice, teachers' attendance at seminars dedicated to issue of gifted children, number of pupils in the classrooms, and types of age-heterogeneous or homogenous classrooms).

Research tool was a self-constructed questionnaire validated using exploratory factor analysis and showing acceptable reliability ($\alpha = 0,77$) (in detail in Machů & Kočvarová, 2013). Except for demographic data, it contains 19 items aimed at school quality in terms of care for gifted pupils. Items (numbered 10-19) adverting to the issue of application of differentiated instructions in education of gifted preschoolers were extracted from the questionnaire. The questionnaire was answered by 345 kindergarten teachers.

Each of the items of the questionnaire offered three different solutions for practical application example of differentiated instructions in controlled activities in education of preschoolers. One of the options represented an inadequate solution, as it was not in accordance with specific educational needs of gifted children and did not offer the possibility of curriculum modification (respondents earned 0 points in case of choosing this one). Another option was a compromise solution, where teachers used limited possibilities of curriculum modification and thus developed children's giftedness, but they did not respect the principles of inclusive education (1 point). Gifted children were labeled, significantly preferred, or rejected in comparison with the rest of children. Another option was considered as showing ideal approach towards care for gifted children in terms of our criteria for integrated enriching curriculum (2 points).

Content of the questionnaire was consulted with professionals in this field, as well as with teachers with practice. It was emphasized that the questionnaire should not contain any options prompting the answers with the highest number of points. The following table represents an example of three questionnaire items (including number of the item) and their score:

Table 1: An example of three questionnaire items including scoring

11	<p>a) Concerning controlled activities in education, all the pupils are treated in the same way. I lower the requirements for quality or quantity of fulfilling the tasks only for the disadvantaged pupils. (0 points)</p> <p>b) Concerning controlled activities, I offer to pupils various tasks (with simpler and more difficult variants) related to the topic of education. Pupils have the possibility to choose from the simpler or more difficult ones. (2 points)</p> <p>c) Concerning controlled activities, I offer to pupils various tasks with simpler and more difficult variants related to the topic of the education. The bright and gifted pupils are given the more difficult task. (1 point)</p>
13	<p>a) If any of the pupils finishes the controlled activity earlier than the other pupils, the teacher motivates the pupil to work on another, more challenging topic. (1 point)</p> <p>b) If any of the pupils finishes the controlled activity earlier than the other pupils, he/she can dedicate time to own activities, on which he/she usually works during free activities (e.g. reading books, use a PC). (0 points)</p> <p>c) If any of the pupils finishes the controlled activity earlier than the other pupils, the teacher motivates the pupil to work on a more challenging task related to the same topic. (2 points)</p>
18	<p>a) A kindergarten has got few didactic aids for development of gifted preschoolers (children's encyclopaedias, atlases, children's fiction, computers, etc. (0 points)</p> <p>b) A kindergarten has got enough didactic aids for development of gifted preschoolers. These aids can be used by all the children of the school. (2 points)</p> <p>c) A kindergarten has got enough didactic aids for development of gifted preschoolers. These aids can be used by all the children for whose they are intended. (1 point)</p>

Research sample was composed of teachers working at common kindergartens. There were 345 respondents from region of Zlínský kraj in the Czech Republic. We created the hypotheses using demographic data observed on the participants of the research.

3. Results of the research

The first goal was to assess the level of application of differentiated instructions in education of gifted children as a whole. Maximal score in the questionnaire was 20 points and minimal 0 points (it means 10 items, each with the option of reaching 0,1, and 2 points). Generally, teachers reached from 1 to 18 points. Concerning total questionnaire score, we decided to create the following intervals for assessing the level of application of differentiated instructions. Average score of all the respondents was 11.28 points. This score was marked as average.

Table 2: Results of the test as a whole, and criteria of the test evaluation

<i>Result</i>	<i>Amount of points achieved</i>	<i>Number of respondents</i>	<i>Percentage from the research sample</i>
Completely unsatisfactory	1 – 4 points	12	3.48 %
Inefficient	5 – 7 points	32	9.27 %
Not satisfactory	8 – 10 points	82	23.77 %
Average	11 – 13 points	122	35.36 %
Successful	14 – 16 points	84	24.35 %
Very successful	17 – 18 points	13	3.77 %

Another task was to detect the best and worst evaluated items in the questionnaire, which explore the level of application of differentiated instructions in education of gifted children. In the individual items, the respondents could reach 0 to 2 points. The worst evaluated item was item n. 15 related to group work. The respondents reached in average 0.98 points. Thirty-five percent of respondents do not differentiate during group work and children with different level of abilities are given the same tasks. Twenty-four percent of teachers offer differentiated instructions, but intentionally only to the gifted children. The second worst evaluated item was item n. 12. The respondents reached at average 0.99 points. Thirty-five percent of the respondents do not offer to children who finish their tasks earlier than the others any complementary or developing activity. Twenty-eight percent of teachers plan the complementary activities, but intentionally only for the group of gifted children.

The best evaluated item in the questionnaire was item n. 16 with average score 1.38 points. This item related to creativity development of children. Almost 57 % of teachers declare that when creating activities, they give to children freedom of their accomplishment, and eliminate products prepared in advance that are finished by the children according to given algorithms. Only 18 % of teachers claim that they prefer algorithmic process of solving. The second best evaluated item was item n. 19. The average evaluation was 1.34 points and was related to the issue of assessing the children. 53 % of teachers use individualized tools for assessing the children's performance and only 20 % prefer summative assessment.

Second goal was to assess the level of application of differentiated instructions in education of gifted children in terms of individual items (hereinafter three factors), and compare this level from point of view of chosen demographic characteristics of teachers and classrooms (length of teaching practice, teachers' presence at seminars dedicated to the issue of giftedness, number of students in the class, age heterogeneous or homogeneous). At first we validated the chosen questionnaire items using exploratory factor analysis in the program Statistica. We controlled the data for meeting the basic requirements of factor analysis (Bartlett's Test of Sphericity, Keiser-Meyer-Olkin measure). Findings of the factor analysis are shown in the following table:

Table 3: Items distribution into three factors in the questionnaire

	<i>F1</i>	<i>F2</i>	<i>F3</i>
Item 19	0,687		
Item 16	0,594		
Item 18	0,526		
Item 14	0,519		
Item 12		0,791	
Item 11		0,591	
Item 13		0,567	
Item 15		0,542	
Item 10			0,771
Item 17			0,591
% of Variance	16,161	14,410	11,183
Cumulative %	16,161	30,571	41,753

According to the focus of the items pertaining to individual factors, we stated the following names of the factors, to which we joined topical focus of the individual items with their number in the questionnaire:

- F1: “differentiation of didactic methods and aids” contains items relating to topics of need to create heterogeneous groups during group work (14), development of creative thinking (16), didactic aids and their usage by all the children (18), and individualized children assessment (19).
- F2: “differentiation of education content” contains items relating to need to include simpler and more difficult variants of tasks (11), developing enriching tasks (12), need of work on enriching tasks developing former educational activities (13), and creating individual challenging roles during children’s work.
- F3: “need of targeted giftedness development” contains items relating to need to develop giftedness using targeted educational processes in terms of controlled activities (10), and teachers’ willingness to update educational tools relating to individual children’s needs (17).

Relating to defined demographic items in the questionnaire, we decided to isolate the goal into four following hypotheses. At first we focused on the length of teaching practice. We stated the hypothesis H1: level of application of differentiated instructions in education of gifted pupils gets better with rising length of teaching practice. We divided length of teaching practice into two groups. The first group was composed of teachers with teaching practice up to 10 years (54% of teachers). The second group was formed by teachers with teaching practice more than 10 years (46 % of teachers). Using Mann-Whitney U test we found out that there is a significant difference concerning teaching practice ($p < 0.001$). As you can see in the table n. 4, grey coloured values show statistically significant differences, with all of them being at level of significance 0.01. We wanted to find out in what factors of the questionnaire are the differences shown. Results of the U-test for all the factors and questionnaire as a whole are shown in the table n. 4. Using Table n. 5, in which the higher average score concerning F1 and F2 are coloured in grey, we found out that teachers with teaching practice longer than 10 years show better level of application of differentiated instructions. The findings were that teachers with teaching practice longer than 10 years reach better level of application of differentiated instructions in the whole questionnaire, as well as in the factors F1 “differentiation of didactic method and aids” and F2 “differentiated content of education”.

Table 4: Differences in the findings according the length of teachers’ practice

<i>Compared groups</i>	<i>F1</i>	<i>F2</i>	<i>F3</i>	<i>Total</i>
Teaching practice up to 10 years and Teaching practice more than 10 years	< 0.001	0.0132	0.130	< 0.001

Table 5: Average score for F1 and F2

Compared groups	Average score F1 (min.0, max. 8)	Average score F2 (min.0, max. 8)
Practice up to 10 years	4.65 points	3.71 points
Practice more than 10 years	5.61 points	4.21 points
All the groups	5.09 points	3.94 points

The next question was related to findings from the viewpoint of number of pupils in the class. We wanted to find out whether teachers show higher level of application of differentiated instructions in smaller classes with number of students up to 15 (16% of all the cases), in middle sized classes with number of students from 16 to 20 (18%), or in the classes with a high number of students, which means more than 21 pupils (66%). We stated the following hypothesis H2: Level of application of differentiated instructions in education of gifted pupils gets worse with raising number of pupils in the class. When testing the hypothesis, we used Kruskal-Wallis test and multiple comparisons of p-values. Based on the test results, the assumed differences were not proved ($p=0.3895$). Number of pupils in the kindergarten class does not influence the level of differentiated instructions. H2 was rejected.

As a next step, we tried to find out whether teachers show different level of application of differentiated instructions when they teach at age-heterogeneous classes (it means pupils of different age, 48%) or age-homogeneous classes (it means classroom with pupils of approximately the same age, 52%). We states the following hypothesis H3: Teachers teaching at age- heterogeneous classes show higher level of application of differentiated instructions in education of gifted pupils than teachers teaching at age-homogeneous classes. We used Mann-Whitney U-test to prove the hypothesis. The results showed significant differences ($p< 0.001$). You can find the important differences for questionnaire as a whole and for factors F1 and F2 coloured in grey in the table n. 6. As you can see in the table n.7, level of application of differentiated instructions is higher in age- heterogeneous classes for the questionnaire as a whole and for factors F1 “differentiation of didactic methods and aids”, and F2 “differentiated content of education”. Hypothesis H3 was accepted.

Table 6: Differences in the results according to type of class (age- heterogeneous or homogeneous)

Compared groups	F1	F2	F3	Total
Age-heterogeneous and homogeneous	0.0089	0.0321	0.1506	0.000986

Table 7: Average score for F1 and F2

Compared groups	Average score F1 (min.0, max. 8)	Average score F2 (min.0, max. 8)
Age-heterogeneous	5.36 points	4.21 points
Age-homogeneous	4.84 points	3.68 points
All the groups	5.09 points	3.94 points

The last comparison was related to teachers’ knowledge of the issue of giftedness (36%), it means whether they attended any educational event connected to this topic or not (64%). We stated the following hypothesis H4: Teachers trained in the issue of giftedness show higher level of application of differentiated instructions in education of gifted pupils than untrained ones. We used Mann-Whitney U-test to prove the hypothesis. We found out that there are significant differences for the questionnaire as a whole. There was no significant difference proved for the individual factors. Using the table n. 9 and average score for the questionnaire as a whole, we found out that the group of trained teachers show higher level of application of differentiated instructions. Hypothesis H4 was accepted.

Table 8: Differences in the results according to teachers’ knowledge of the issue of giftedness

Compared groups	F1	F2	F3	Total
Trained teachers & Untrained teachers	0.1973	0.0772	0.0678	0.0133

Table 9: Average score for the questionnaire as a whole

<i>Compared groups</i>	<i>Average score for the questionnaire as a whole (min.0, max. 20)</i>
Trained teachers	11.93 points
Untrained teachers	10.95 points
All the groups	11.28 points

4. Summary, discussion and conclusion

Aim of our research probe was to explore the level of application of differentiated instructions in education of gifted preschoolers, declared by kindergarten teachers in the questionnaires.

First of all, we were interested in finding out the level of application of differentiated instructions in education of gifted pupils shown in the questionnaire as a whole. Almost 37 % of the research sample showed inadequate or unsatisfactory level of application of differentiated instructions, as they reached less than half of the maximum score. On the other hand, almost 28 % of the respondents showed satisfactory results, since they reached at least 14 points from the maximum of 20 points. Average score of all the respondents was 11.28 points. This number was given the outcome “average” being very close to the outcome “unsatisfactory”. This finding proves that there are certain deficiencies in care for gifted pupils. If we compare this finding with abovementioned researches (Westberg & Daoust, 2004; Van Tassel-Baska & Stambaugh, 2005), it is a common state of care for pupils in kindergarten classes and lower primary school education.

Let us focus on the individual items. Teachers do not show any problems with development of children’s creativity and offer freedom in solving inventive tasks. They can evaluate pupils formatively, individually, and they combine their own evaluation with pupils’ self-evaluation. On the other hand, there is a problem with planning different levels of educational goals for differentiation of the pupils relating to their giftedness. Teachers tend to plan only one level of educational goal designed for all the pupils. This problem is the most obvious at a single task for group work, or offering the same task to pupils who are ready with this task earlier than their colleagues. If we sum up the findings of the questionnaire as a whole, we can find out that teachers have problems with modification of the content of curriculum. They are more successful at modification of the educational process and evaluation. If they apply the chosen modifications, they are not in accordance with the principles of inclusive education.

Another aim was to assess the level of application of differentiated instructions in education of gifted pupils in terms of individual items. We used factor analysis to test the data. Three factors arose from the results of the analysis, and they were given the following names: F1 “differentiation of didactic methods and aids”, F2 “differentiated content of education”, and F3: “need of targeted development of giftedness”. Relating to the defined demographic items of the questionnaire, we decided to divide the aim into four hypotheses, results of which you can find in the table n. 10.

Table 10: Overview of the hypotheses for the partial goal of the research

<i>Hypothesis</i>	<i>Result</i>	<i>Factors showing the differences</i>
H1: Level of application of differentiated instructions in education of gifted pupils gets better with rising length of teaching practice.	Hypothesis accepted.	F1, F2.
H2: Level of application of differentiated instructions in education of gifted pupils gets worse with raising number of pupils in the class.	Hypothesis rejected.	
H3: Teachers teaching at age- heterogeneous classes show higher level of application of differentiated instructions in education of gifted pupils than teachers teaching age- homogeneous classes.	Hypothesis accepted.	F1, F2.
H4: Teachers trained in the issue of giftedness show higher level of application of differentiated instructions in education of gifted pupils than teachers who were not trained.	Hypothesis accepted.	Only for the questionnaire as a whole.

Rather than confirming our initial assumptions, we have identified variables which positively affect the level of application of differentiated instructions. These are length of teaching practice over 10 years, type of the secondary school (age-heterogeneous), and targeted training of teachers in the issue of giftedness. Concerning hypotheses H1 and H3, the results were showed both for the questionnaire as a whole, and the factors F1 and F2. It means that teachers with length of teaching practice longer than 10 years, and those teaching at age- heterogeneous classes (It means classes with pupil of different age) can better differentiate in terms of didactic methods and aids, as well as content of education.

Let us focus on individual variables relating to the findings of similar researches. For example Vašutová (2004) found out, that teacher' didactic competencies get better with length of teaching practice. On the other hand, we do not agree with the findings of some of the specialists (for example Laznibatová, 2001). We do not agree with the finding, that the most appropriate candidates for work with gifted pupils are young teachers and graduates of the faculties of education. Concerning type of secondary school, it could have been assumed, that teachers naturally tend to apply differentiated instructions in age-heterogeneous classes. Teachers use much more uniform types of instructions in age-homogeneous classes, where the pupils are similar in terms of age and level of thinking maturity. In accordance with our assumptions, we found out that teachers attending certain type of trainings aimed at the issue of giftedness showed higher level of differentiated instructions. According to Švec (2012), we realise that the questionnaire was aimed only at explicit, theoretical teachers' knowledge, which gets better by further teachers' training. We identified the variable – the number of pupils in the class. This variable, being contrary to our assumptions, does not influence the level of application of differentiated instructions. Relating to this, the findings of our research were in accordance with Nind & col. (2013) claim that number of pupils with specific educational needs does not influence the quality of education.

After we presented our findings, it is also needed to point out the limitations connected with the conducted research. The biggest limitation which was manifesting during the whole research is, in our opinion, the simplification of the pedagogical reality into 3 possible answers evaluated with 0, 1 and 2 points and the artificial metrisation of this data. We are aware that all the measuring in education and also in other areas, is considered to be relative, simplifying and serves the paradigm which we do through the evaluation of the teachers' answers. Another problem was that our questionnaire was focused only on selected aspects of pedagogical work with gifted preschoolers, which were related to the curriculum modification and inclusive education. Furthermore, despite the big amount of validly filled in questionnaires (345) the research cannot be considered to be large area survey and the results cannot be generalized for the whole region of Zlínský kraj in the Czech Republic.

We are also aware that the teachers may have described the application of their educational strategies in the questionnaire to be better than it is in reality. On the other hand, we can look at the results of the research not only from the viewpoint of what educational strategies the teachers use but also which strategies the teachers think are suitable for the development of the children' giftedness. For this reason, we consider a subsequent research where the research data would come from the direct observation of the education process by a trained observer.

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